Attachment 4. Project Description

Groundwater monitoring is an essential tool to assist Lassen County with implementation of its Groundwater Management Plan (GWMP), adopted in June, 2007. Lassen County has developed and adopted a Basin Management Objective (BMO) program that utilizes groundwater level monitoring to guide management of groundwater on a groundwater basin or sub-groundwater basin scale. Groundwater level monitoring is being utilized to identify areas of declining groundwater levels, enabling a fast response by the County and local stakeholders. Ongoing groundwater monitoring provides information needed to document current conditions, assess long-term trends, and to support development and to guide implementation of BMOs.

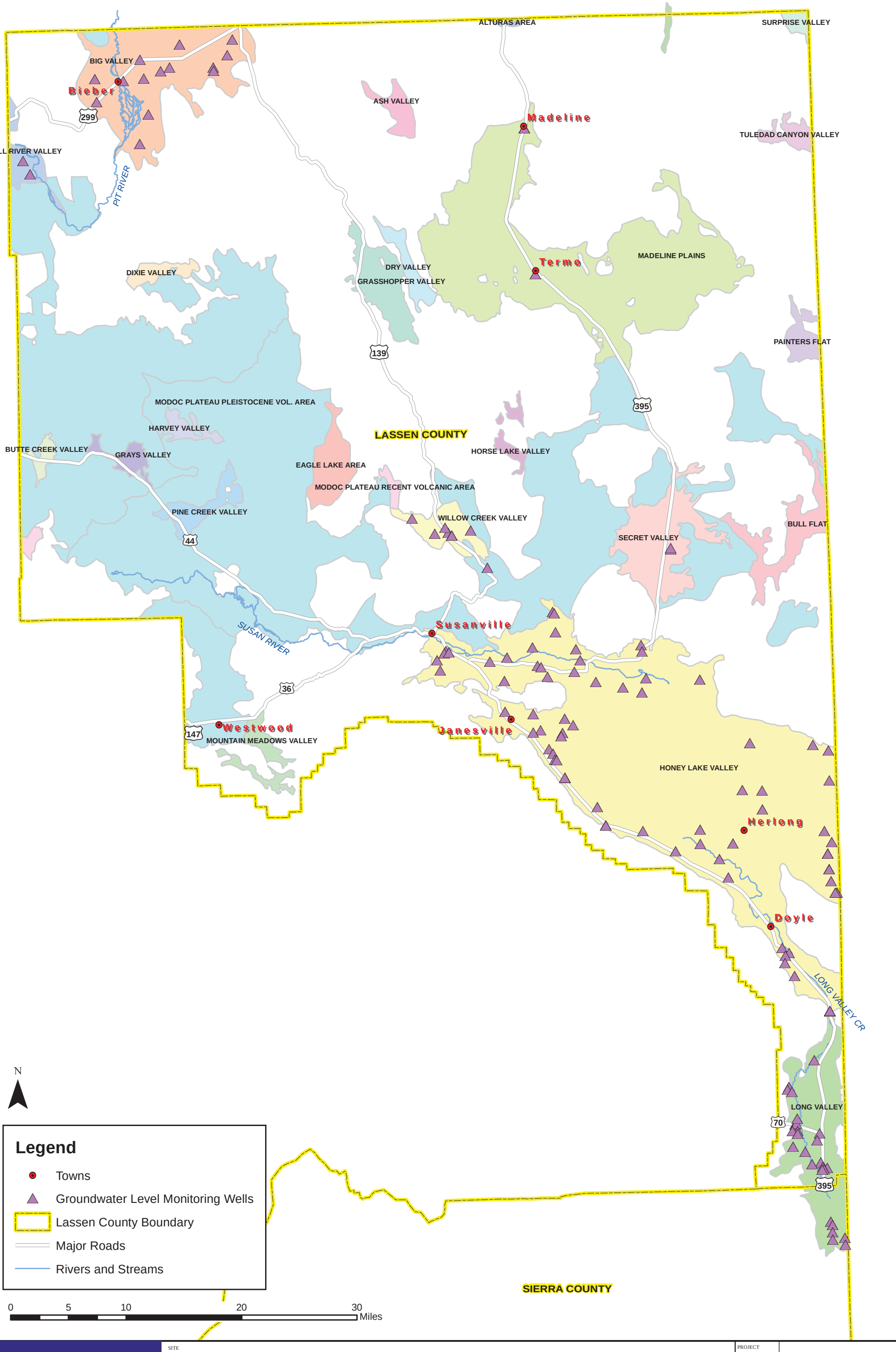
Groundwater level monitoring in Lassen County has historically been performed by the Department of Water Resources, Northern Region Office (DWR) on a semiannual basis, in March and October. DWR currently monitors a network of 104 wells in Lassen County. Groundwater level monitoring occurs in seven out of the 24 groundwater basins in Lassen County, including Long Valley, Honey Lake Valley, Willow Creek Valley, Big Valley, Secret Valley, Madeline Plains, and Fall River Valley (Figure 1).

Under SBX7-6, DWR established the California Statewide Groundwater Level Monitoring (CASGEM) program. Under CASGEM local agencies are encouraged to apply to become monitoring agencies for areas under their jurisdiction. Lassen County applied to be a CASGEM compliant groundwater monitoring entity in 2011, and wrote a CASGEM Groundwater Monitoring Plan (included as Appendix A in this project description) as well as worked with DWR's online CASGEM data system to reach approved monitoring entity status.

All of the 104 monitoring wells in the current monitoring grid in Lassen County are privately owned. During the CASGEM approval process, Lassen County was informed that for the County's monitoring grid to be CASGEM compliant, the County must acquire permission from each private well owner. A letter conveying that information to Lassen County is included as Appendix B to this project description.

Lassen County is a rugged, rural, economically disadvantaged portion of California inhabited by many individualists and residents that avoid interaction with authority on a regular basis. Lassen County believes, based on its experience developing its GWMP and BMO programs, that many private well owners will refuse to make their well information public, and thus removing them from the Lassen County monitoring grid. Lassen County expects that over half of current monitoring well participants will refuse to make their well information public, resulting in the loss of over 50 groundwater level monitoring locations. The loss of these monitoring points will make the monitoring grid inadequate to monitor for long term regional groundwater trends in important groundwater basins in Lassen County.

The primary goal of this proposed study is to maintain adequacy of the Lassen County groundwater level monitoring grid during its transition into CASGEM compliance. Current monitoring grid well owners will be contacted and asked for permission, data gaps in the remaining monitoring grid will be analyzed and new monitoring areas recommended. Following data gap analysis, new monitoring wells will be targeted and work will be conducted to include them in the CASGEM compliant monitoring grid. Lassen County plans, through this project to maintain adequacy of long term regional groundwater trends in Lassen County's 24 groundwater basins.



Brown AND Caldwell

SITE	Lassen County	PROJECT 139893	Figure 1
TITLE	Groundwater Level Monitoring Wells	DATE 4/21/2011	

About Lassen County

Groundwater resources have long played an important role in the development, growth, and sustainability of Lassen County and its residents. It is a source of drinking water, irrigation water for the agricultural community, and supports important environmental needs through its interaction with surface water and related habitat. Local groundwater users and the County work collaboratively to manage and protect groundwater resources for current and future generations. However, driven by evolving demands for groundwater within and adjacent to Lassen County, groundwater management continues to increase in complexity and scope; specifically, past and current projects to develop and export groundwater in Nevada from interstate basins shared with Lassen County may impact Lassen County residents reliant on these groundwater basins. As a result, the Lassen County Board of Supervisors (BoS) directed development of the GWMP, development of the BMO program, and application to become a groundwater monitoring entity under CASGEM to help understand and protect the County's groundwater resources.

Concern Addressed by the Proposed Project

The primary concern addressed by this proposed project is the loss of monitoring points due to the requirement in CASGEM that; privately owned monitoring wells have owner permission to share well construction and location information publically. Lassen County believes that over half of the existing monitoring grid participants will decline participation in CASGEM, and action will need to be taken to locate new monitoring wells to maintain the adequacy of the monitoring grid to monitor for long term regional groundwater trends in Lassen County. As such, Lassen County is requesting grant funding to pursue access agreements with private well owners that will meet the requirement of CASGEM compliance and potentially improve upon the network previously established.

Project Goals

The overarching project goal is to maintain the adequacy of groundwater level monitoring in a CASGEM compliant monitoring program in Lassen County to monitor for long term regional groundwater trends. Supporting this overarching goal, the proposed project also pursues meeting the following objectives.

1. **Improve public understanding of the need for groundwater monitoring.** An informed public is more likely to support and give permissions for increased monitoring throughout Lassen County. Lassen County has been working on this objective since its adoption of the GWMP in 2007, and has continued through the implementation of the BMO program. Task 2 of the proposed project includes public outreach activities that help inform the public of the need for monitoring through public meetings at the Board of Supervisors and the BMO Groundwater Committee as well as public directed messaging.
2. **Increase the areas in Lassen County to be adequately monitored for groundwater levels.** The current monitoring grid monitors seven of the 24 groundwater basins in Lassen County. As part of the proposed project, a data gap analysis will be conducted that evaluates the 17 unmonitored basins and determines if they require monitoring based on well infrastructure and land use. If identified as needing additional monitoring, the proposed project will work to find CASGEM compliant monitoring points in those basins.
3. **Improve understanding of subsurface geology.** Groundwater basins in Lassen County are poorly understood, with the primary reference being DWR's Bulletin 118 groundwater basin descriptions. As part of this project a new dedicated multi completion monitoring well will be drilled, logged by a professional geologist, and used to improve understanding of subsurface conditions in a groundwater basin in Lassen County.

Project Components

The project will consist of the following elements as described briefly below and in detail in the work plan in the following section of this application.

1. CEQA Documentation, Permitting and Access. This task provides CEQA compliance, and acquires the appropriate permits for installation of monitoring wells. CEQA compliance and County permits are essential for project execution, because they are required by law.
2. Public Outreach. Public outreach is an essential component of the BMO development process. Communication with the public through newsprint, internet announcements, and other means will be essential to reach as many potential monitoring partners for the California Statewide Groundwater Elevation Monitoring program (CASGEM) enhancement program. Public outreach will be focused on providing project information to the broadest section of the public possible.
3. Update Current Monitoring Grid Owner Permission. The current monitoring grid in Lassen County utilizes 104 private wells, shown in Figure 1. Under the CASGEM program, monitoring wells are required to list construction and location information. This information can only be shown in the CASGEM program with well owner permission. Currently, none of the 104 wells monitored in Lassen County have well owner permission. This task works to acquire consent to publicize well information from current monitoring well owner, receive permissions from well owners, update CASGEM with the owner's permission, and document the work performed.
4. Data Gap Analysis After current monitoring well owners have signed permission forms, the remaining monitoring grid will be evaluated for its adequacy to provide long term regional scale monitoring for Lassen County groundwater basins. Lassen County is a diverse county containing whole or portions of 24 different groundwater basins. Currently groundwater level monitoring occurs in seven of the 23 groundwater basins. The number of basins monitored may be reduced after well owner permissions are granted or denied by well owners. Because the remaining CASGEM compliant monitoring wells are likely to be insufficient to provide long term regional scale monitoring, a data gap analysis will be conducted to identify the best areas to increase monitoring in Lassen groundwater basins.
5. Identify, Contact, and Acquire Permission to Use New Monitoring Wells. This task will select new existing wells and work to verify well information and receive permission from well owners for each well's inclusion in Lassen County's CASGEM monitoring program. The task will begin once the Data Gap Analysis TM has been completed and may take up to 6 months to complete.
6. Installation of Groundwater Monitoring Wells. This task involves the installation of one triple completion monitoring wells. Monitoring well installation and analysis provides detailed geologic logs and information with identification of formation contacts for assessment of subsurface conditions. This well will be added to the California Statewide Groundwater Elevation Monitoring (CASGEM) system to provide water level data for the region.
7. Update Lassen County Monitoring Plan. This task will update the existing Lassen County CASGEM compliant Monitoring Plan with the new monitoring wells identified and installed by this project. The updated CASGEM plan will include updated maps of monitoring well locations, and rationale for remaining unmonitored basins. The updated Monitoring Plan will ensure full compliance by Lassen County as a monitoring agency under CASGEM.
8. Project Management. Project management will include activities such as project team coordination, budget and schedule tracking, quality assurance and quality control activities, quarterly reports, and other efforts as needed to complete the project scope of work on schedule and budget.

Project's Relationship to the Region's Groundwater Management Plan

Lassen County's Board of Supervisors adopted the County's GWMP included in Attachment 3 in 2007. The proposed project is directly related to the primary goal of the 2007 GWMP "to maintain or enhance groundwater quantity and quality, thereby providing a sustainable, high-quality supply for agricultural, environmental, and urban use into the future that remains protective of the health, welfare, and safety of residents." This goal cannot be met without an adequate monitoring network and understanding of groundwater.

Long Term Need for Project

As a CASGEM monitoring entity, Lassen County is responsible for the long term monitoring of groundwater levels, protection of public health, and management of the available supply of groundwater. Lassen County needs an adequate monitoring grid to achieve these two objectives, and is ready to perform the long term work necessary to maintain monitoring into the future.

Lassen County and its Board of Supervisors have clearly demonstrated a willingness to pay the cost necessary to ensure the protection of its groundwater resources. This includes ensuring adequate monitoring, reporting and public dialogue regarding the groundwater resource. This propensity has been demonstrated because Lassen County has, and continues to fund programs meant to protect and understand groundwater resources.

The majority of the responsibilities agreed to or asserted by the Board have been delegated to the Lassen County Department of Planning and Building Services. Said Department is a General Fund Department. That is, the Department's operation is paid directly by the County General Fund (which is comprised of property tax revenue, sales tax revenue and other sources that do not restrict the use of the funds).

The Board has publicly, at multiple meetings, recognized the importance of groundwater management. The Board has acknowledged and demonstrated that it will increase the Department's budget and staffing commensurate with the responsibilities that have been added to the Department.

Lassen County's public has also demonstrated its willingness to "fund" the protection of and understanding of groundwater. For example, the recent Basin Management Objective Ordinance adopted by the Board was developed through a working group that provided their time (and thus in essence "funded" the project). The group had to meet regularly for about a year. A similar volunteer working group helped develop the Groundwater Management Plan, adopted in 2007. The willingness and desire of the public to participate in groundwater issues help ensure the success of programs the County pursues.

Collaboration

There has already been significant demonstrated collaboration on groundwater management in Lassen County as shown by the development of the BMO program. The BMO program is directed by a Groundwater Committee made up of local groundwater interests. The Groundwater Committee, who provided input into the Lassen County CASGEM groundwater monitoring plan, included the following members in 2011:

Working Group Members	
Member	**Organization**
Jack Hanson	Lassen County Board of Supervisors
Bob Pyle	Lassen County Board of Supervisors
Richard Egan	Lassen County
David Lile	UCCE
Kevin Mitchel	Agriculture – Big Valley
Todd Swickard	Agriculture -
Maurice Anderson	Lassen County
Dan Newton	City of Susanville
Gaylon Norwood	Lassen County
Shawn Wheelock	USDA Forest Service
Paul Herman	Long Valley Groundwater Management District
Bob Anton	Honey Lake Valley Resource Conservation District
Kelly Staton	Department of Water Resources Northern District
Dan McManus	Department of Water Resources Northern District
Tim Garrod	Honey Lake Resource Conservation District
Pat Williams	Herlong Public Utilities District
Edward Kranz	Agriculture - Madeleine Plains

Members of the groundwater committee represented many divergent groundwater interest in Lassen County, and provided collaboration to identify the proposed project, and support of the proposed project.

New Knowledge and Improved Management

The proposed project will add significant new knowledge to our understanding of groundwater, aquifer parameters, and understanding of the long term regional groundwater trends in Lassen County groundwater basins. The new monitoring points and dedicated groundwater monitoring well will improve understanding of hydrogeology in Lassen County.

Ongoing Use of Project

Lassen County, as a designated CASGEM monitoring entity, will continue to use the updated monitoring grid and dedicated multi completion monitoring well into the future. The monitoring wells will be added to the CASGEM program for water levels. Collected data will be shared with the public through the CASGEM program, and monitoring wells will be used in the County's BMO program to manage groundwater levels. Finally, Lassen County will maintain monitoring activities, should DWR stop performing monitoring as part of its ongoing groundwater management responsibility.

Appendix A

Portions of Lassen County CASGEM Groundwater Monitoring Plan

Brown AND Caldwell

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Technical Memorandum

Prepared for: Lassen County

Project Title: Lassen County Basin Management Objectives Development

Project No: 139893

Lassen County CASGEM Groundwater Monitoring Plan

Date: November 29, 2011

To: Gaylon Norwood

From: John Ayres, Project Manager

Prepared by: Rhianna Eads, Geologist

Reviewed by: John Ayres, Senior Hydrogeologist, Lic #910

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1. Introduction

This Technical Memorandum presents Lassen County's California Statewide Groundwater Elevation Monitoring (CASGEM) compliant monitoring plan. This monitoring plan follows the guidance indicated on the *CASGEM Monitoring Plan Summary*, released on May 4, 2011. The guidance summary states that the basic components of a CASGEM monitoring plan include:

- Discussion of the well network,
- Map(s) of the well network,
- Monitoring schedule
- Description of field methods,
- Discussion of the role of cooperating agencies, and
- Description of the monitoring plan rationale.

This monitoring plan addresses the basic components of a CASGEM monitoring plan by utilizing the following sections and subsections:

- Section 2: Monitoring Rationale – This section describes the reasoning behind the proposed monitoring identified in the monitoring plan
- Section 2.1: Cooperating Agencies – This section identifies the cooperating agencies involved in the monitoring that Lassen County is the identified monitoring entity for.
- Section 3: Well Network – This section presents the proposed well network identified in the monitoring plan.
- Section 3.1: Well Network Map - This section includes maps showing the well network and groundwater basins to be monitored, as well as a table of wells to be monitored under the plan.
- Section 3.2: Monitoring Schedule – This section discusses the timing of measurements on the monitoring grid.
- Section 4: Field Methods – This section identifies the methods for monitoring to be used by field staff.

2. Monitoring Rationale

Groundwater monitoring is an essential tool to assist Lassen County with implementation of its Groundwater Management Plan (GWMP), adopted in June, 2007. Lassen County is currently developing Basin Management Objectives (BMOs) that utilize groundwater level monitoring to guide management of groundwater on a groundwater basin or sub-groundwater basin scale. Groundwater level monitoring is being utilized to identify areas of declining groundwater levels, enabling a fast response by the County and local stakeholders. Ongoing groundwater monitoring provides information needed to document current conditions, assess long-term trends, and to support development and to guide implementation of BMOs.

Groundwater level monitoring in Lassen County is currently performed by the Department of Water Resources, Northern Region Office (DWR) on a semiannual basis, in March and October. DWR currently monitors a network of 124 wells in Lassen County. Groundwater level monitoring occurs in seven out of the 24 groundwater basins in Lassen County, including Long Valley, Honey Lake Valley, Willow Creek Valley, Big Valley, Secret Valley, Madeline Plains, and Fall River Valley.

Groundwater level monitoring in Lassen County will continue the established DWR program of monitoring. The County will continue to monitor the 124 groundwater monitoring locations that are currently monitored. The County considers this monitoring grid adequate to determine long term groundwater trends in the basins that are monitored in Lassen County.

Lassen County contains a portion of or the entirity of 23 groundwater basins, seven of which are monitored at this time. Sixteen groundwater basins are not monitored. These basins do not need monitoring at this time due to the small scale of anthropogenic land use, small number of groundwater wells, and small human populations in these basins.

Table 2-1 presents Bulletin 118 recognized groundwater basins in Lassen County, with a brief description of each basin and the number of monitoring wells in each basin. One monitoring well in the Lassen County grid falls outside of recognized groundwater basins and are not included in Table 2-1. Information in Table 2-1 was compiled during development of Lassen County's GWMP, and monitoring well listings have been updated with current monitoring numbers collected during development of the County's BMO program this year.

Table 2-1 Lassen County Groundwater Basins from Bulletin 118

Basin #	Basin Name	Area (acres)	Formations	GW Level Trends	Estimated Total Storage (1) (acre-ft)	Water Level Monitoring Wells	Well Production (Average GPM)
6-4	Honey Lake Valley	311,750	Holocene Sedimentary Deposits Pleistocene Lake and Near-shore Deposits Plio-Pleistocene and Pleistocene Volcanic Rocks	10 foot decline in early 1990s with recovery since	10,000,000	71	784
6-104	Long Valley	46,840	Quaternary Sedimentary Deposits Tertiary Hallelujah Formation	Steady	300,000	24	Unk
5-4	Big Valley	92,000	Holocene Sedimentary Deposits Pliocene Lava Flows Beiber Formation	15 foot decline in early 1990s with 12 foot recovery by 1999	3,750,000	14	880
6-3	Willow Creek Valley	11,700	Holocene Sedimentary Deposits Holocene Basin Deposits Pleistocene to Holocene Basalt Pliocene Lake Deposits	2-10 foot decline in early 1990s with recovery since	Unk	7	382
6-1	Surprise Valley	228,460	Holocene Alluvial Fans Holocene Alluvium Deposits Pleistocene Near-shore Deposits Pleistocene to Holocene Lake Deposits	Unk	4,000,000	0	1,383
6-2	Madeline Plains	156,150	Holocene Sedimentary Deposits Pleistocene Near-Shore Deposits Pleistocene Lake Deposits Plio-Pleistocene Basalt	3-8 foot decline in early 1990s with recovery since	2,000,000	3	less than 500

(1) Actual usable storage, based on well infrastructure, is a small percentage of the estimated total storage, typically less than 10 percent of total storage.

(2) Unk denotes that the attribute is unknown

Table 2-1 Lassen County Groundwater Basins from Bulletin 118							
Basin #	Basin Name	Area (acres	Formations	GW Level Trends	Estimated Total Storage (1) (acre-ft)	Water Level Monitoring Wells	Well Production (Average GPM)
5-2.01	Alturas GW basin, South Fork Pit River Subbasin	114,000	Holocene Sedimentary Deposits Pleistocene Near-Shore Deposits Pleistocene Volcanic Rocks Plio-Pleistocene Alturas Formation	10 foot decline in early 1990s with recovery since	Unk	0	1,075
5-5	Fall River Valley	54,800	Holocene Sedimentary Deposits Holocene Volcanic Rocks Pleistocene Near-shore Deposits Pleistocene Volcanic Rocks Pliocene Volcanic Rocks	Shallowest depth to GW in northern portion of basin	1,000,000	2	266
6-100	Secret Valley	33,680	Holocene Sedimentary Deposits Plio-Pleistocene Basalt Pliocene Lake Deposits	Increased 10-20 feet 1980 to 2000, 10 foot decrease 2000 to 2005	Unk	2	Unk
6-94	Grasshopper Valley	17,670	Holocene Sedimentary Deposits Pleistocene Near-Shore Deposits Pleistocene Lake Deposits Plio-Pleistocene Basalt	Unk	Unk	0	Unk
6-95	Dry Valley	6,500	Holocene Sedimentary Deposits Pleistocene Near-Shore Deposits Pleistocene Lake Deposits Plio-Pleistocene Basalt	Unk	Unk	0	328
6-99	Painters Flat	6,400	Pleistocene Lake Deposits Pleistocene Basalt	Unk	Unk	0	Unk
6-96	Eagle Lake Area	Unk	Quaternary Lake Deposits Holocene Basalt	Unk	Unk	0	Unk

(1) Actual usable storage, based on well infrastructure, is a small percentage of the estimated total storage, typically less than 10 percent of total storage.

(2) Unk denotes that the attribute is unknown

Table 2-1 Lassen County Groundwater Basins from Bulletin 118							
Basin #	Basin Name	Area (acres	Formations	GW Level Trends	Estimated Total Storage (1) (acre-ft)	Water Level Monitoring Wells	Well Production (Average GPM)
6-101	Bull Flat	18,100	Unk	Unk	Unk	0	Unk
6-92	Pine Creek Valley	9,530	Unk	Unk	Unk	0	Unk
5-8	Mountain Meadows Valley	8,150	Unk	Unk	Unk	0	Unk
5-54	Ash Valley	6,010	Unk	Unk	Unk	0	2,200
5-52	Grays Valley	5,440	Unk	Unk	Unk	0	Unk
6-98	Tuledad Canyon	5,200	Unk	Unk	Unk	0	Unk
5-53	Dixie Valley	4,870	Unk	Unk	Unk	0	Unk
6-93	Harvey Valley	4,500	Unk	Unk	Unk	0	Unk
6-97	Horse Lake	3,800	Unk	Unk	Unk	0	Unk
5-51	Butte Creek Valley	3,230	Unk	Unk	Unk	0	Unk

(1) Actual usable storage, based on well infrastructure, is a small percentage of the estimated total storage, typically less than 10 percent of total storage.

(2) Unk denotes that the attribute is unknown

2.1 Cooperating Agencies

Lassen County is currently cooperating with three agencies regarding groundwater monitoring.

Department of Water Resources, Northern Region Office

DWR established the current groundwater monitoring grid and currently monitors groundwater levels in March and October. If DWR stops performing monitoring, the County will perform monitoring, and will rely on DWR for technical support and guidance. The County is currently planning to include a DWR representative on the County's BMO Technical Advisory Committee.

Sierra County

If DWR stops performing monitoring, Sierra County will perform groundwater monitoring in the Sierra County portion of Long Valley. Sierra County will perform the water level monitoring and report monitoring results to Lassen County for compilation with monitoring performed in the Lassen County portion of Long Valley and submittal to DWR.

Honey Lake Resource Conservation District

Honey Lake Resource Conservation District (Honey Lake RCD) currently performs groundwater monitoring on a number of monitoring wells in the Honey Lake groundwater basin. If DWR stops performing monitoring, Honey Lake RCD will continue monitoring and provide monitoring information to Lassen County for compilation and submittal to DWR.

3. Well Network

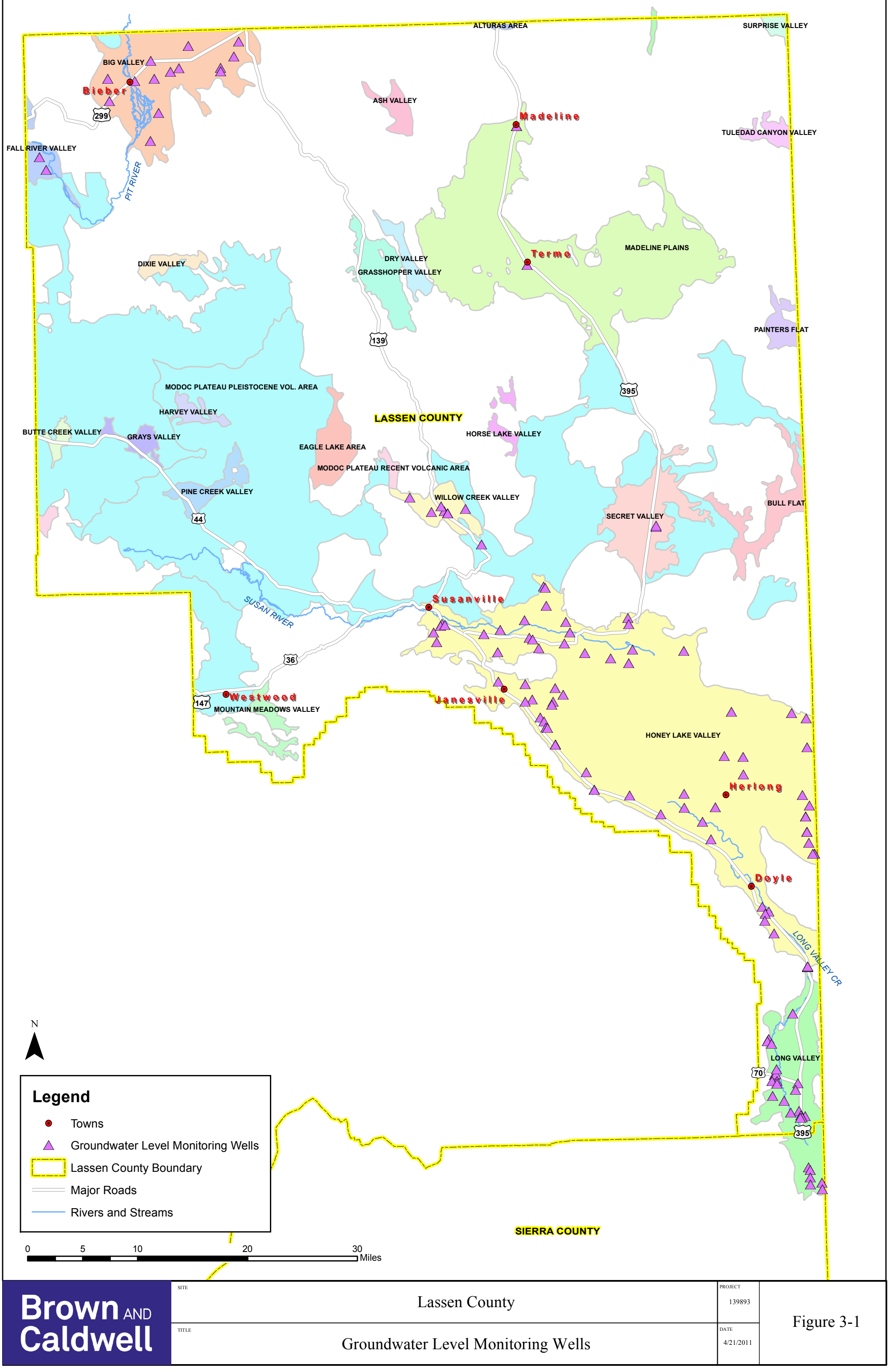
3.1 Well Network Map

The distribution of monitoring locations within the groundwater level monitoring network is shown in Figure 3-1. A complete listing of monitoring wells, with state well number, location coordinates, and groundwater basin is included in Appendix A. Figures 3-1A through 3-1C present groundwater level monitoring well locations with monitoring well labels. The labels in figures 3-1A through 3-1C are the state well number, with the township and range portion of the state well number removed for label spacing. Identification of points is performed by identifying the section, tract, and number information.

3.2 Monitoring Schedule

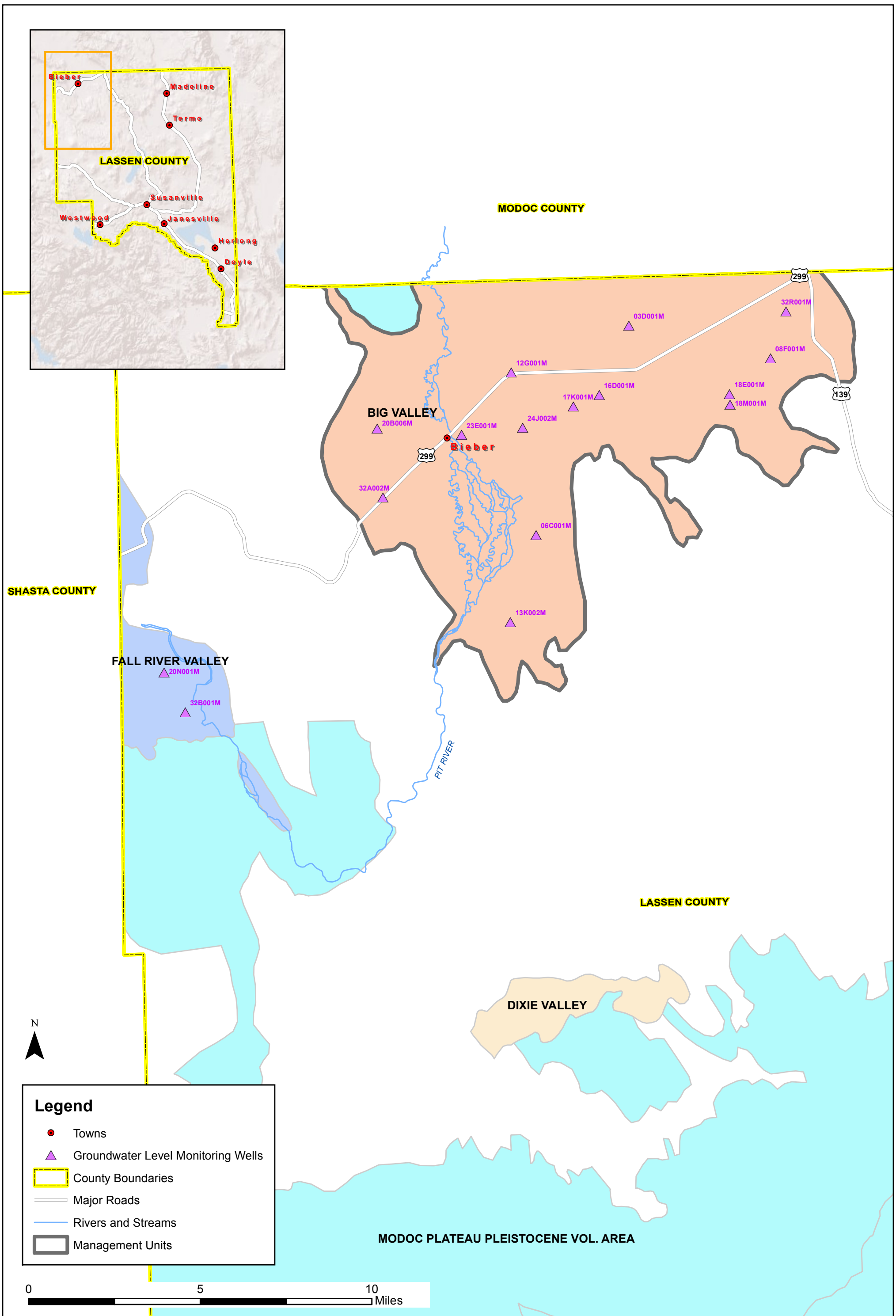
Lassen County will continue monitoring on the schedule established by current DWR monitoring. Lassen County will monitor levels in every monitoring well in the Lassen County grid two times per year, once in the spring, usually March, and once in the fall, usually October. All wells will be measured within one week of each other. The goal of March and October measurements is to capture groundwater levels in the monitored basins at their highest and near lowest each year.

A monitoring well network with a regular monitoring schedule provides data that can be used for analysis of long-term water level trends. Groundwater pumping typically peaks during the summer growing season, and slows in the winter. Comparisons of groundwater levels in specific wells from spring, of one year to spring of other years can indicate groundwater trends, such as lowering of the groundwater table during a drought period, and is utilized in the County's BMO program.



Brown AND Caldwell

SITE	Lassen County	PROJECT 139893	Figure 3-1
TITLE	Groundwater Level Monitoring Wells	DATE 4/21/2011	



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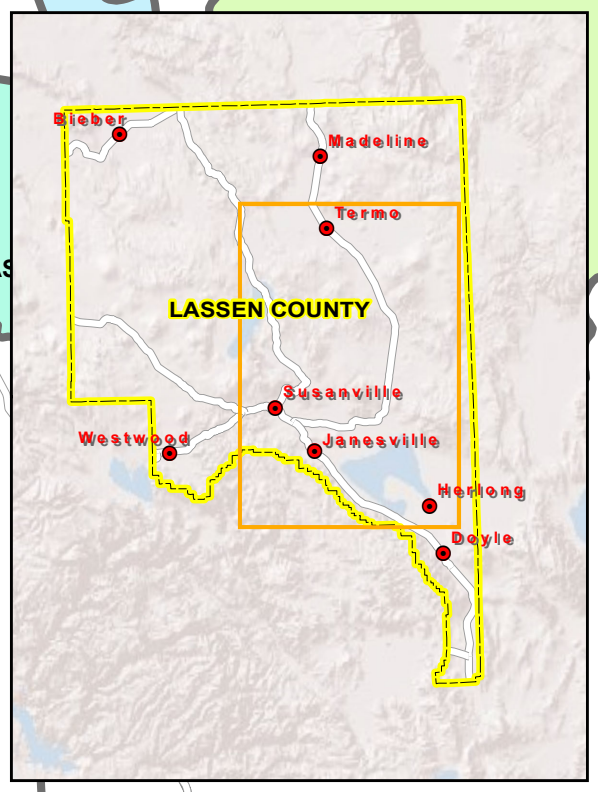
SITE	Lassen County	PROJECT 139893	Figure 3-1A
TITLE	Groundwater Level Monitoring Wells	DATE 4/21/2011	



Termo 26J002M

Madeline Plains

MADELINE PLAINS

PAINTERS FLAT

GRAS

Eagle Lake

HORSE LAKE VALLEY

MODOC PLATEAU RECENT VOLCANIC AREA

139

MODOC PLATEAU PLEISTOCENE VOL. AREA

395

12G001M

Willow Creek Valley

WILLOW CREEK VALLEY

16A001M

13E001M

17J001M

15P003M

SECRET VALLEY

26N002M

26N001M

LASSEN COUNTY

31L001M

BULL FLAT

19M001M

19P001M

31F001M

36

44

Susanville

02L001M

09D001M

09B006M

10D001M

09M002M

07Q001M

16C001M

14G003M

14J001M

16M002M

20A002M

24G001M

Honey Lake Mgmt Units

20K001M

22Q001M

21N001M

30A002M

30M001M

32C001M

05A001M

07A001M

Janesville

08J001M

14D002M

11R001M

18K001M

18B001M

23G001M

HONEY LAKE VALLEY

25B001M

30M001M

26B002M

06B001M

11E001M

12K001M

15P001M

24G001M

26E004M

29P001M

30M001M

Herlong

06D001M

03D002M

08H001M

PLUMAS COUNTY

N

Legend

- Towns
- Groundwater Level Monitoring Wells
- County Boundaries
- Major Roads
- Rivers and Streams
- Management Units

0 5 10 Miles

Brown AND Caldwell

SITE	Lassen County	PROJECT 139893	Figure 3-1B
TITLE	Groundwater Level Monitoring Wells	DATE 4/21/2011	

Honey Lake Mgmt Units

HONEY LAKE VALLEY

LASSEN COUNTY

PLUMAS COUNTY

WASHOE COUNTY

SIERRA COUNTY

LONG VALLEY

Herlong

Doyle

395

LONG VALLEY CR

01P001M
26E003M
29P001M
30M001M
35B001M
06D001M
01C001M
02M001M
11A001M
08H001M
13E001M
25G002M
25G003M
25G001M
20B001M
21L001M
21N001M
29H001M
33J001M
13J003M
13J004M
13J002M
02N001M
20H001M
20A001M
21M002M
33Q002M
04G002M
09C001M
04F001M
11P001M
09G002M
16F001M
15P002M
27A001M
25E001M
26H002M
24Q001M
24F001M
24P002M
31F001M
25L001M
31P001M

N

Legend

- Towns
- Groundwater Level Monitoring Wells
- County Boundaries
- Major Roads
- Rivers and Streams
- Management Units

0 2.5 5 10 Miles

Brown AND Caldwell

SITE	Lassen County	PROJECT 139893	Figure 3-1C
TITLE	Groundwater Level Monitoring Wells	DATE 4/21/2011	

4. Field Methods

DWR has established procedures for measuring water levels in dedicated monitoring wells and production wells in their Groundwater Elevation Monitoring Guidelines document (DWR, 2010). Lassen County will follow the monitoring protocols identified in the document and has included the document as Appendix B. Various methods exist for water level measurements and include the steel tape method, electronic sounding tape method, sonic water-level meter method, and the pressure transducer method. Each method has considerations for accuracy and reliability in different well types or field conditions. A brief explanation of each method is given below; for more in-depth information and instructions on using each method, data entry forms, and well information forms are included in Appendix B.

4.1.1 Reference Point

Before measurement of water levels, a reference point (RP) must be established to the same datum as the well to ensure data comparability between water level elevations and the well. The RP decimal latitude and longitude is referenced to the North American Datum System of 1983 (NAD83), and vertical elevation to the North American Vertical Datum of 1988 (NAVD88). The RP is determined by either surveying to a bench-mark, using a United States Geological Survey (USGS) 7.5' quadrangle map, using a digital elevation model, or global positioning system (GPS). The RP must be clearly marked in a location near or on the well, so all future measurements can be made to the RP.

After the RP is established, the land-surface datum (LSD), or average elevation of the ground around the well, is measured by the person making the initial water level measurement. The LSD is commonly the concrete well pad or well vault, which are often more permanent than the surrounding ground surface. A reference mark (RM) may also be established to re-establish the RP later if it needs to be changed or is destroyed. All well data must be submitted in a well data form, see DWR Form 429, and sent to DWR with photographs documenting location and RP.

4.1.2 Water Level Measurements

There are four methods commonly used for water level measurements, the steel tape method, electronic sounding tape method, sonic water-level meter method, and the pressure transducer method. Each method has been adapted for use in both dedicated monitoring wells or for production wells designated for water level monitoring. A suggested equipment and supply list has been included in DWR 2010 that incorporates each method. Before making measurements, the measuring tape must be inspected for rust, breaks, kinks, and possible stretch. The tape should be compared periodically with a graduated steel tape to ensure graduations are accurate.

General considerations for water level measurements for both well types include accounting for well cap type, activity and use of wells in the nearby vicinity, and well obstructions. Well caps can be of two types, vented or non-vented. If non-vented, the cap must be removed to allow the air pressure in the well to equalize with atmospheric pressure and the water level to stabilize. Pumping in nearby or in the designated production well will affect the water level and give false results. The general recommendation of DWR is to measure the well at least 24 hours after pumping has ceased, if possible, to allow for the well to recover. Well obstructions, such as pumps, must be removed from the well before measurements can be made. Issues or conditions such as recent or nearby pumping or well obstructions must be documented on the field form. Other issues, such as non-vertical well casing, cascading water or water entering the casing from the top of the well may affect the validity or determination of water level measurements and must also be documented in field forms and/or log books.

Supplies needed for each method include a watch, calculator, GPS instrument and/or map for well location, and digital camera for documenting well and field conditions. The water level meter with graduated measuring tape, well data forms, pens with indelible ink for recording data on field forms, equipment logs books, well lock keys, and wrenches are also required. A well file including previous measurements is strongly suggested for checking the current measurement with historical measurements.

The first steps for water level measurement are the same for all methods. Date, time, and field conditions such as weather or nearby pumping are documented on the field form and the well cap is removed. The well is inspected and any obstructions are removed. The previous water level measurement may be checked and used to estimate the amount of tape that will be used at the well. The tape is checked for defects and cleanliness and disinfected if required.

Steel Tape Method

The graduated steel tape or wetted-tape method is considered to be the most accurate method for measuring water levels in non-flowing wells of less than 200 ft. The first lower 5-10 ft of tape must be cleaned and disinfected before measurement, rinsed with deionized water, and dried before use. A stainless steel or other weight is attached to the bottom of the tape for monitoring wells. The lower few feet of tape is chalked with carpenters or sidewalk chalk and is slowly lowered into the well until the tape is at the water surface and the next graduation of the tape is at the well RP. The tape is brought rapidly to the surface and the mark on the wetted chalk is read as the water surface depth. The depth to water is calculated by subtracting the water surface depth from the well RP measurement. The measurement is repeated again, and averaged if repeated more than two times. The tape is cleaned and disinfected after use.

Electric Sounding Tape Method

The electric sounding tape method is easier and quicker than the steel tape method, and is good for measurements in rainy conditions or with cascading water. The method is good for wells up to 500 ft deep. The battery and electrode probe must be tested before use, and calibration is more frequent than with the steel tape method. The lower 5-10ft of tape is cleaned, disinfected, and dried before use. The indicator sounder is tested and then the tape is lowered into the well. When the probe reaches the water surface, a beeper will sound. Lift the tape and then lower to test the water depth, which may be done multiple times to ensure the true water surface is reached. The depth is read at the well RP as the depth to water. The tape is recoiled and cleaned after use.

Sonic Water-Level Meter Method

The sonic water-level meter method utilizes sound waves to measure water levels and can be utilized in both monitoring and production wells. The method is not as accurate as the other methods, but does not have the same risks of cross-contamination between wells. A cover plate must be used to cover wellheads that have openings greater than the factory cover plate, which is generally 5/8” in diameter. The meter and batteries are checked each time before measurement. The ambient air temperature within the well must be measured each time the method is used, and the temperature probe is lowered to about half the depth of the previous measurement. The temperature and depth range is set on the sonic meter. The meter duct is inserted into the access port and the depth is read from the readout for a covered wellhead. For an open wellhead, a cover plate is used to provide a seal for the sonic meter.

Pressure Transducer Method

The pressure transducer method is used to make automated water-level measurements with a pressure transducer attached to a data logger. Water level data is recorded at set time intervals and is downloaded periodically, and can be imported directly into a database or spreadsheet. Selection of the appropriate pressure transducer depends on expected range of groundwater level, program requirements, and well

conditions. The pressure transducer is installed inside the well at a specified depth and programmed to collect water level and barometric pressure measurements at a set time interval. This method provides the most complete picture of groundwater levels over time but requires specific equipment and programming requirements. For a complete description of installation and measurement procedures, see DWR Groundwater Elevation Monitoring Guidelines (DWR, 2010).

References

Department of Water Resources, CASGEM Monitoring Plan Summary, 05/04/2011, http://www.water.ca.gov/groundwater/casgem/documents.cfm, accessed 05/20/11.

Department of Water Resources, Groundwater Elevation Monitoring Guidelines, December 2010.

Appendix A: Current Monitoring Grid State Well Numbers

State Well Number	EASTING	NORTHING	Groundwater Basin
37N07E13K002M	658477	4545046	Big Valley
37N08E06C001M	659677	4549133	Big Valley
38N07E12G001M	658515	4556757	Big Valley
38N07E20B006M	652230	4554122	Big Valley
38N07E23E001M	656188	4553817	Big Valley
38N07E24J002M	659053	4554153	Big Valley
38N07E32A002M	652492	4550893	Big Valley
38N08E03D001M	664026	4558940	Big Valley
38N08E16D001M	662640	4555698	Big Valley
38N08E17K001M	661428	4555161	Big Valley
38N09E08F001M	670672	4557411	Big Valley
38N09E18E001M	668748	4555733	Big Valley
38N09E18M001M	668774	4555243	Big Valley
39N09E32R001M	671395	4559606	Big Valley
28N13E11R001M	714351	4463263	Honey Lake
28N13E14D002M	713336	4462966	Honey Lake
28N14E07A001M	717717	4464937	Honey Lake
28N14E08J001M	718882	4463974	Honey Lake
28N14E18B001M	717422	4462936	Honey Lake
28N14E18K001M	717226	4462514	Honey Lake
25N17E20B001M	748051	4432921	Honey Lake
25N17E21L001M	748988	4432207	Honey Lake
25N17E21N001M	748488	4431889	Honey Lake
25N17E29H001M	748428	4430846	Honey Lake
25N17E33J001M	749756	4429032	Honey Lake
26N15E02M001M	733168	4446452	Honey Lake
26N16E03D002M	741177	4447516	Honey Lake
26N16E06D001M	736632	4447429	Honey Lake
26N16E08H001M	739296	4445368	Honey Lake
26N16E16Q001M	740523	4442783	Honey Lake
26N17E01C001M	754950	4447722	Honey Lake
26N17E11A001M	754383	4446118	Honey Lake
26N17E11A002M	754383	4446118	Honey Lake
26N17E13E001M	754555	4443917	Honey Lake
26N17E13E002M	754555	4443917	Honey Lake
26N17E24F001M	754849	4442278	Honey Lake
26N17E25G001M	755667	4440675	Honey Lake
26N17E25G002M	755667	4440675	Honey Lake
26N17E25G003M	755434	4440680	Honey Lake

State Well Number	EASTING	NORTHING	Groundwater Basin
27N14E06B001M	717796	4456637	Honey Lake
27N14E06B002M	717757	4456661	Honey Lake
27N14E15P001M	722281	4452609	Honey Lake
27N14E26E003M	723434	4450025	Honey Lake
27N14E26E004M	723434	4450025	Honey Lake
27N15E29P001M	728614	4449230	Honey Lake
27N16E11E001M	742474	4454955	Honey Lake
27N16E12K001M	745256	4454869	Honey Lake
27N16E24G001M	745274	4452275	Honey Lake
27N16E30M001M	736576	4449460	Honey Lake
27N17E01P001M	754601	4456294	Honey Lake
27N17E35B001M	753908	4449280	Honey Lake
28N13E02M001M	713346	4465532	Honey Lake
28N13E05A001M	709420	4465894	Honey Lake
28N13E24L001M	715544	4460653	Honey Lake
28N13E25B001M	716084	4460032	Honey Lake
28N13E25J001M	716358	4459188	Honey Lake
28N14E30M001M	716598	4459128	Honey Lake
28N16E23G001M	743508	4461498	Honey Lake
28N17E23M001M	752337	4461289	Honey Lake
28N17E25C001M	754466	4460506	Honey Lake
29N12E04Q001M	701165	4474373	Honey Lake
29N12E08J002M	699923	4473095	Honey Lake
29N12E09B006M	700943	4474022	Honey Lake
29N12E10D001M	701575	4474187	Honey Lake
29N12E16M002M	700403	4471659	Honey Lake
29N13E02L001M	713234	4474895	Honey Lake
29N13E07Q001M	707276	4472853	Honey Lake
29N13E09M002M	709690	4473481	Honey Lake
29N13E14G003M	713940	4472290	Honey Lake
29N13E14J001M	714434	4472075	Honey Lake
29N13E20K001M	709309	4470207	Honey Lake
29N13E24G001M	715324	4470767	Honey Lake
29N14E09D001M	719304	4474652	Honey Lake
29N14E16C001M	719861	4473106	Honey Lake
29N14E20A002M	719078	4471452	Honey Lake
29N14E22Q001M	722069	4470055	Honey Lake
29N15E08A001M	728373	4475200	Honey Lake
29N15E08R002M	728508	4474296	Honey Lake

State Well Number	EASTING	NORTHING	Groundwater Basin
29N15E21N001M	729039	4470564	Honey Lake
29N15E30M001M	725850	4469270	Honey Lake
29N15E32C001M	728485	4468616	Honey Lake
29N16E30A002M	736552	4470388	Honey Lake
30N14E19M001M	716016	4479837	Honey Lake
30N14E19P001M	716287	4479626	Honey Lake
30N14E31F001M	716420	4476989	Honey Lake
22N17E04F001M	749840	4408324	Long Valley
22N17E04G002M	750020	4408434	Long Valley
22N17E09B001M	750183	4407401	Long Valley
22N17E09C001M	749445	4407412	Long Valley
22N17E09G002M	750188	4407018	Long Valley
22N17E11G001M	753258	4407060	Long Valley
22N17E11P001M	752902	4406116	Long Valley
22N17E15P002M	751246	4404502	Long Valley
22N17E16F001M	749551	4405250	Long Valley
22N17E23Q001M	753421	4403034	Long Valley
22N17E25E001M	754335	4402250	Long Valley
22N17E26H001M	753701	4402380	Long Valley
22N17E26H002M	753865	4402106	Long Valley
22N17E26J001M	753629	4402014	Long Valley
22N17E27A001M	752208	4402792	Long Valley
23N17E02N001M	752511	4417285	Long Valley
23N17E20A001M	748964	4413600	Long Valley
23N17E20H001M	748794	4413231	Long Valley
23N17E21M002M	749401	4412867	Long Valley
23N17E33Q002M	750135	4409112	Long Valley
24N17E13J001M	754684	4424085	Long Valley
24N17E13J002M	754684	4424085	Long Valley
24N17E13J003M	754705	4424148	Long Valley
24N17E13J004M	754697	4424179	Long Valley
35N13E26J002M	713627	4526914	Madeline Plains
37N13E16A001M	712098	4547228	Madeline Plains
37N13E16A002M	712098	4547228	Madeline Plains
31N13E31L001M	706946	4486008	Outside Groundwater Basins
31N15E26N001M	732507	4488534	Secret Valley
31N15E26N002M	732491	4488745	Secret Valley
37N06E20N001M	642236	4542681	Fall River Valley
37N06E32B001M	643228	4540821	Fall River Valley

State Well Number	EASTING	NORTHING	Groundwater Basin
31N11E12G001M	696462	4492816	Willow Creek Valley
31N12E13E001M	704602	4491178	Willow Creek Valley
31N12E15M001M	701501	4490865	Willow Creek Valley
31N12E15P001M	701994	4490490	Willow Creek Valley
31N12E15P002M	701994	4490490	Willow Creek Valley
31N12E16A001M	701020	4491579	Willow Creek Valley
31N12E17J001M	699624	4490701	Willow Creek Valley

Appendix B

Letter from Department of Water Resources Regarding Need for Permissions to Use Private Wells in CASGEM

STATE OF CALIFORNIA – CALIFORNIA NATURAL RESOURCES AGENCY
EDMUND G. BROWN JR, Governor

DEPARTMENT OF WATER RESOURCES
NORTHERN REGION OFFICE
2440 MAIN STREET
RED BLUFF, CA 96080-2356

April 27, 2012

Mr. Gaylon Norwood
County of Lassen
Planning & Building Services
707 Nevada Street, Suite 5
Susanville, California 96130

Dear Mr. Norwood:

This is in reply to your recent phone call requesting the status of Lassen County into the Department of Water Resources' (DWR) California State Groundwater Elevation Monitoring (CASGEM) Program.

Lassen County has applied to be the designated monitoring entity for the twenty-three Bulletin 118 groundwater basins within the county. So far, Lassen County has submitted all the required documentation for the basins and has listed DWR voluntary wells for monitoring in applicable groundwater basins. However, SBX7-6 states that monitoring well networks must consist of CASGEM monitoring wells, not voluntary wells as explained below.

The CASGEM Program has two types of wells—*CASGEM* and *voluntary*.

Construction information for CASGEM wells is publicly available on the CASGEM website. Data from wells owned by DWR or other government agencies are considered to be public information, and may be used freely as CASGEM wells.

Voluntary wells can be used in addition to CASGEM wells, but do not count as part of the monitoring compliance of the basin(s). The well construction information for voluntary wells is confidential and unavailable for viewing on the CASGEM website. Privately owned wells that DWR measures are voluntary wells. If you are using, or plan to use, a privately owned well that DWR measures as part of your CASGEM monitoring grid, permission must be obtained from the owner(s) to measure the well *and* to make the construction data publicly available. DWR has permission to measure these wells but not to make the construction data public. It is your responsibility to obtain permission prior to making privately owned well construction data public. Additionally, public supply wells are not allowed to be used for CASGEM.

In order to be approved as the designated monitoring entity for your groundwater basin(s), you must have a satisfactory monitoring grid made up of CASGEM wells. Under special circumstances, alternate monitoring plans may be developed under the criteria of AB1152, such as when monitoring is impractical due to certain conditions associated with the basin. Alternate monitoring plans must be developed by a California Registered Professional Geologist and approved by DWR before final designation will be granted.

The CASGEM website (http://www.water.ca.gov/groundwater/casgem/index.cfm), contains information regarding the CASGEM program including links to SBX7-6 and AB1152.

If you have any questions or need additional information, please contact me at (530) 528-7403.

Sincerely,

William M. Ehorn, Chief
Data Collection and Management Section